Wisconsin Department of Natural Resources

Division of Forestry

Strategic Plan

Information Technology

2003-2007

Acknowledgments

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Executive Summary

This information technology (IT) plan is a tool used to guide the allocation of resources to IT within the Division of Forestry. The plan provides justification for IT spending throughout the division. It outlines the IT business needs, the current IT status, and future IT strategies to meet those business needs.

This plan is a starting point for the division's IT processes. However, the plan is incomplete. It requires continual input and updating from all levels of the division as business needs and technology change. It should constantly be referred to and updated.

All bureaus within the division require and utilize IT. Depending upon what IT planning or implementation project is being conducted, one or more bureaus staff time and money will be required. Necessary IT resources span across different levels of government and to the private sector. Individual bureau staff will be required to work in concert with division IT staff, BEITA, other division and department staff, and potentially private IT consultants.

This IT plan has been divided into several distinct architectures to focus on the specific business needs and resources within the Division of Forestry. Many of the business needs overlap the different architectures and future strategies require resources from several architectures to meet those needs. The architectures are as follows: Applications, Information, Technology, Organization, Internet, and Security.

Applications - Business Needs: In general, Forestry's applications are out-of-date, not well supported or documented, difficult to update, difficult to access, and complex to use. 1.) Most of Forestry's processes have a mapping component, however, few of Forestry's mission-critical applications have mapping functionality. 2.) Because several applications (Plantrac and Rave) are standalone (not connected to a network database) it is difficult for other Forestry staff to access the data that these applications use. 3.) Because each of Forestry's customized applications is written in a different programming language it can be difficult to update them. Several of Forestry's customized applications are built upon expensive software packages that require annual maintenance fees making it difficult for some users to acquire the applications. Most of Forestry's applications are dependent upon a certain computer platform, making it impossible to use these applications on field computers, other computer platforms, or older computers. 4.) The Recon/Timber Sale program is unique in that almost half of its users are non-DNR employees from individual counties. County forest users require the same access to DNR Forestry's applications and databases as DNR foresters do. 5.) Users of non-mission-critical data require simple, inexpensive applications. In particular, users need a simple, inexpensive GIS application to perform general GIS and mapping tasks.

Applications - Future Strategies: 1.) Forestry applications that are simple to use should be developed in a common programming language with mapping functionality that can be used on a variety of computer platforms. 2.) These applications should be supported and easily updated by Forestry staff. 3.) Mission-critical applications should be accessible via the internet and the data they use should be stored in a centralized database. 4.) A simple, inexpensive GIS application should be provided for non-mission-critical GIS users.

Information - Business Needs: Currently there is a lot of data that could be of use to Forestry staff, business partners, and the public. 1.) However, this data is not readily accessible to users either because its location is not well documented, because its not in a centralized location, or because it is difficult to place the data in a centralized location. 2.) Because most of Forestry's processes have a mapping component, users need better access to digital imagery (digital orthophotos, satellite images, etc.) so that they can digitize layers for maps (compartment, timber sale, boundary, etc.) using a GIS. If

this imagery is not available it needs to either be purchased or created in-house. The remote sensing plan needs to be updated to reflect the increased use of digital imagery by foresters.

Information - Future Strategies: 1.) Data should be stored in a centralized database that is accessible via the internet and updateable by multiple users. 2.) Digital imagery should be obtained or created for locations where it is lacking. 3.) The aerial photography contract should be updated to include digital image products.

Technology - Business Needs: 1.) Users need better access to all types of data. This can be accomplished by providing them with faster internet connections, by putting more information in a centralized database that is accessible on the internet, and by providing users with better direction and keeping them better informed. 2.) Users need more efficient ways of collecting data in the field and incorporating that data into existing databases. To do this, users need field data computers, GPS units, and software to incorporate field data into existing databases.

Technology - Future Strategies: 1.) Provide dial-up users with faster internet connections. 2.) More data should be stored in a centralized location (database or file server) that is accessible via the internet. 3.) Where efficiencies can be gained, field data should be collected with field computers, GPS units, and specialized software to incorporate field data into existing databases. If staff are provided with adequate internet connection speeds, data are placed in a centralized database, and applications are available via the internet then PC upgrades become less of an issue.

Organization - Business Needs: 1.) Users need better IT direction from the central office. 2.) Users need more support with all aspects of IT. 3.) Users need more IT training. 4.) Existing IT expertise need to be recognized, trusted, organized, and utilized.

Organization - Future Strategies: 1.) Hopefully this document will enable the central office to provide better IT direction. 2.) Additional IT support staff should be hired, especially a GIS support person located in the northern region. 3.) Existing IT expertise within Forestry should be recognized, trusted, organized, and utilized for IT training, support, and planning.

Internet - Business Needs: 1.) Forestry's website needs to be more visible. 2.) Forestry's website needs to be easier to update. 3.) Forestry's website needs to contain more information. 4.) Forestry's website needs to be interactive, providing a means of multilateral communication. 5.) Forestry's mission-critical applications need to be incorporated into the website.

Internet - Future Strategies: 1.) Forestry's website should be the gateway to all Forestry data and mission-critical applications. 2.) There should be a streamlined process to update information on the website. 3.) More individuals should be trusted to update the website. 4.) A simpler forestry internet address should be used, such as forestry.wi or www.forestry.wi. 5.) The website should be promoted via advertising.

Security - Business Needs: The DNR has properly addressed many IT security issues. However, several of the business needs outlined above could violate the current security architecture of the DNR. These constraints need to be dealt with before these business needs can be remedied. These business needs are as follows; 1.) non-DNR employees need access to DNR data, applications, and networks, and 2.) the efficient use of field data computers requires that these devices be connected to DNR networks and be able to access DNR databases.

Foreword

Today, information technology (IT) is one of the largest emerging tools in sustainable forest management. It permeates every aspect of the forestry program from the first contact a landowner has with the Web site, through the myriad systems that manage and provide access to forestry's information, to the desktop computer — now such a fundamental part of the daily life of nearly every forester.

But IT, though critical, is still just a tool. It relies on people for its effective utilization, whether they use these tools on a daily basis, create or design new uses for these tools, or ensure that these tools are in good repair. And equally important is the need to upgrade tools and acquire new, more effective ones that save time, money and effort. With new tools comes additional training for users and evaluations of the best use of these tools.

This plan was written to guide the Division of Forestry's annual investment of over $1 million for the purchase of hardware, software, application development, IT support, and data. The Forestry Leadership Team and other division staff want to be sure that the correct investments in IT and support for division staff to efficiently and effectively accomplish our sustainable forestry mission. Staff must make increasingly more complex natural resource management decisions. Access to the best available information is needed to enable us to make the best decisions.

This plan begins a process to organize and manage in a consistent format all forestry IT needs and resources so that the shared vision of sustainable forests can be achieved. To achieve a position of leadership, forestry must implement an effective and integrated strategic plan for the use of IT in forest management, protection, teaching and learning, and administrative support –with consideration to furthering the mission of the division.

Forestry needs a comprehensive plan for IT, backed by a commitment to action. The acceleration of technological advances, a statewide strategic planning effort, increasing demands for information from internal and external users, and partnerships with local communities and organizations have created the need for a forestry IT plan.

While the IT trends are difficult to project, it seems clear that forestry will observe the following technological changes:

- The **Internet is increasing in use** for access to data, as a mechanism to serve forestry applications and information to multiple users, and as an important tool for communication with internal staff and external partners.
- Staff and partners want **better information, provided faster**, to help them improve productivity and manage **emergency situations**.
- **New expectations of staff** for continuing professional development related to information technology.
- The ability of the computer to **process and present information and simulations in new ways** providing unique opportunities for the enhancement of forest management.
- Changes in the patterns and methods of collaboration across disciplines and in widely **dispersed geographic locations**, make new demands on communication and information technologies.
- Data **collection standards are increasing** in use within the Department making information available to other programs.
- New methods of communication raise complicated **issues of access, security, and privacy**.

- The widespread implementation of networks, personal computers, and other distributed technologies has given divisions and **individual users greater control** of their own use of information technology.
- Staff resources are limited so success depends on **simple tools and applications** that will do the job along with adequate support at the field level.
- **Geographic Information Systems** are replacing manual means of managing and integrating maps and descriptive data.

Vision Statement:

This plan should be comprehensive and far-reaching. It should provide an aggressive and bold, yet thoughtful and measured vision for how IT should be developed, used, and applied in the division over the next few years. The plan should emphasize the increasing importance of the use of technology to manage the forests of Wisconsin and to communicate with our partners and the public. The plan should recognize that eminence in the use and application of IT requires forestry to build more effective partnerships with other divisions as well as with industry and government, both at the State and Federal levels. The plan should also be realistic in that it highlights the need to balance central direction in the development of some areas of IT with the distributed responsibility of individuals in the regions. And finally it should acknowledge the importance of effective access to forestry's infrastructure and information assets from anywhere and at any time.

I: Applications Architecture

Introduction:

The applications architecture refers to the automated processes or systems that an organization uses to support its programs and to provide service to its customers. The applications architecture also includes the interrelationship among the organization's applications in terms of sharing data access to applications and the presentation of applications to users.

Vision Statement: Software applications are developed that enable efficient deployment and support using the most efficient technologies required to meet the business needs of the division, its partners, and its customers. Simple, non-proprietary, royalty-free, and low-cost or free software are used or developed preferentially instead of complex, proprietary, and expensive software. Applications are developed and employed that require a minimum of computer resources, are usable across operating systems, and are usable across hardware systems. Forestry staff are able to support and update applications.

Organizational Goals and Business Needs:

In general, Forestry's applications are out-of-date, not well supported or documented, difficult to update, difficult to access, and complex to use.

1. Forestry staff need to be adequately trained to use all Forestry applications.

2. Applications need to be better supported. Establish application support beyond the DOA's Helpdesk.

3. Most of Forestry's processes have a mapping component, however, few of Forestry's mission-critical applications have mapping functionality.

4. Because several applications (Plantrac and Rave) are standalone (not connected to a network database) it is difficult for other Forestry staff to access the data that these applications use. Plantrac needs to be updated to include mapping functions and so that its map and tabular data reside in a central database. Rave/Raven needs to be updated so that its map and tabular data reside in a central database.

5. Because each of Forestry's customized applications is written in a different programming language it can be difficult to update them. Several of Forestry's customized applications are built upon expensive software packages that require annual maintenance fees making it difficult for some users to acquire the applications.

6. Most of Forestry's applications are dependent upon a certain computer platform, making it impossible to use these applications on field computers, other computer platforms, or older computers.

7. The Recon/Timber Sale program is unique in that almost half of its users are non-DNR employees from individual counties. County forest users require the same access to DNR Forestry's database as DNR foresters.

8. Users of non-mission-critical data require simple, inexpensive applications. In particular, users need a simple, inexpensive GIS application to perform general GIS and mapping tasks.

9. The Recon6i (Recon/Timber Sales Oracle Forms software) programs need to be updated to include mapping functions and so that its map and tabular data reside in a central database.

10. There needs to be an application for structural mapping and hazard typing of fuels for fire.

11. Applications need to be developed that are accessible internally and externally in a reliable, secure and effective manner.

12. Develop and improve existing applications that are reliable, adequately supported, and expandable by both IT and customer staff throughout their useful lives.

13. Manage operating system and database migrations and upgrades in a timely and effective manner and determine the impacts on existing and future forestry applications.

14. The agency should move towards "open source" technology to decrease the cost of application development and support.

Current Architecture:

Plantrac: Standalone Microsoft Access database program for updating, viewing, and reporting MFL data.

Rave/Raven: Standalone ArcView program for updating, viewing, mapping, and reporting Recon data.

Recon6I: Network Oracle Forms program for updating, viewing, and reporting Recon/Timber Sale data.

Future Strategies:

Forestry applications that are simple to use should be developed in a common programming language with mapping functionality that can be used on a variety of computer platforms and can be supported and updated by Forestry staff.

Mission-critical applications should be accessible via the internet and the data they use should be stored in a centralized database.

A simple, inexpensive GIS application should be provided for non-mission-critical GIS users.

The agency should move toward "open source" technology, such as MySQL for free RDBMS. Oracle can be for our A level applications, but for Intranet and less heavily used applications, we should be setting the standard and prodding BEITA (especially during budget crunch) to allow use of such technology. There should be two different technologies allowed one for Intranet and one for Internet. Intranet should be more relaxed.

Mission-critical applications should be updated to be accessible via the internet. Applications written in Java or Active Server Pages (ASP) are accessible via the internet. Applications developed in Java or ASP can be run in a web browser. The main bottleneck for internet applications is the speed of internet access for the user. If internet access speeds are high, then the quality of the user's computer

becomes less of an issue since all they really need is a web browser to run the application. Most web browsers are free. An internet application does not require software to be installed on users' computers when the application is updated. Since the application resides only on the server, when it is updated, users will be able to use that updated application from the same internet address that they are used to accessing. Internet applications can be used on any device that has an internet connection and a web browser, including handheld computers and mobile phones. Therefore, internet Forestry applications should be programmed in Java or ASP, whichever option proves to be more cost effective.

Non-mission-critical applications or applications that require a lot of computer processing should be developed as desktop applications. Desktop applications tend to run faster than internet (or server-side) applications because all processing is performed on the desktop computer. Desktop applications can access internet website databases and remote servers. Desktop applications can be written in many different programming languages. Java desktop applications can be used on any computer platform (Windows, Linux, Palm, WindowsCE, Macintosh, etc). Visual Basic is the most popular language used to develop applications on Windows, however Visual Basic applications can only be used on Windows computers. Borland C++/Delphi desktop applications can be used on Windows or Linux computers and run faster, require less computer resources, and are easier to install than Java or Visual Basic applications. Therefore, desktop Forestry applications should be programmed in Java or Borland C++/Delphi, whichever option proves to be more cost effective.

II. Information Architecture

Introduction:

Information Architecture refers to Forestry's organization and design of spatial and tabular datasets. This architecture defines how the data are structured, collected, shared, maintained, stored, documented, and distributed to support the business objectives of the program and its customers.

Vision Statement - Forestry recognizes that its data are among its most valuable business assets. Forestry's Information Architecture provides data, in an electronic format, that adequately support the business needs of the forestry program, its business partners, and the public. Access to Forestry's data is easy, convenient, and reliable, with Forestry Applications serving as the primary mode of data access. Data are available in non-proprietary and commonly accessible formats. Forestry's data is collected or developed to make it as accurate, complete, and secure as possible while still meeting department standards. Data provided to customers is reliable and users are confident that the quality of Forestry's data is high. Data are provided to the public free of non-reproduction charges. The content and quality of Forestry's data are documented consistently and there are clear guidelines for use.

Organizational Goals and Business Needs:

Information Architecture provides the use and design for data solutions that support user and application requirements. Users of an IS/GIS Design must be able to evaluate, access, update and display data through IS/GIS technology. User requirements along with internal and external influences will establish criteria for Information Architecture design enabling information and applications run on the system. Information Architecture baseline requirements are established by a set of organization goals that identify application needs and data requirements.

Internal Influences - Forestry bureau, office, and field operational staff provide the user needs data requirements. Agency policy, standards, and procedures provide support and guidance for data use and development. Planning and funding approval are identified through the biennial budget process and project proposal procedures.

External Influences - As a Program of WDNR, Forestry must conform to data policies, standards, and procedures mandated by DOA. This includes any relevant policies and standards adopted by the Wisconsin Land Information Board (WLIB) and the Wisconsin Land Council (WLC). Finally, because Forestry has many county/local partners and customers it is extremely important that Forestry data is of high quality.

Forestry's Information Architecture may also be influenced by other external governmental activities, such as the implementation of federal and state confidentiality and data access laws.

Organizational Goals and Business Needs - Information Architecture describes the use and design for data solutions in an IS/GIS Design. These requirements are derived from operational goals and business needs identified in projects that build the actual system. Forestry's ability to implement these projects and activities is dependent upon available funding and resources identified in planning and project request cycles. Data use activities include information development, access and sharing by central office, operational field staff, Co-operators and the public.

Information Architecture Operational Goals

- Distribute tabular and spatial information via web and network applications

- Provide recommendations for central data repository and warehousing functions that successfully meet Forestry business needs.
- Integrate Forestry's RDBMS with the agency's Enterprise (ArcSDE) GIS Framework Layers
- Develop Forestry Enterprise (ArcSDE) GIS Framework Layers
- Develop a desktop GIS Library
- Redesign Forestry's RDBMS for GIS spatial representation
- Support and maintain a distributed, geographic-based decision support system to retrieve, summarize, symbolize and display data by area of interest
- Support, ArcSDE, ArcIMS, Window Terminal Sever applications through the agency-standard clients to provide basic geographic query and display of GIS and related databases.
- Update and integrate Forestry's enterprise data holdings, to manage and support efficient access, data collection and data acquisition to ensure the highest accuracy and reliability
- Develop a methodology to integrate spatial and tabular data collected by operational field staff and external partners into central data holdings.
- Develop training procedures for the collection, editing and use of enterprise and desktop datasets
- Improve tracking and management of data documentation and metadata.

See Appendix E for detailed Information Architecture business needs.

Current Architecture:

Major Datasets – Forestry is currently utilizing existing enterprise ArcSDE, Oracle and DVGISLIB data sets for data and application development. Also utilized are the DOP and DRG image libraries.

Data collection and maintenance – Forestry is currently using ArcView 3.2 and tabular desktop applications for data collection and maintenance.

Policies, Standards and Procedures - Forestry uses the established data-related policies, standards and procedures of the DNR to improve the way the program's data are collected, structured, documented and distributed:

- Oracle RDBMS standards promote consistent development of applications.
- Locational data standards facilitate consistent data collection, use, storage, documentation, and distribution of data throughout DNR.
- Required review of logical and physical data models for Oracle applications ensures adherence to appropriate standards.
- Data sharing policies describe robust procedures for DNR to provide data to its customers via the Internet and other media, and to receive data from its external partners.

Data Access/Distribution Functions - The Internet and Intranet will become the primary conduits for providing access to Forestry data and related policies, standards, procedures, files, etc. Forestry uses department procedures for sharing data via other media (e.g., tape, CD).

Future Strategies:

Forestry's approach to Information Architecture includes a vision of a Forestry IS/GIS Design that will implement information architectures, software purchases and upgrades through strategic planning and budgetary cycles. Forestry's successful IS/GIS Design depends on proper need assessment, identification of appropriate components for system integration. A project-based approach to system development reduces risks and promotes successes by a show of product for each phase. These projects involve transition and migration of legacy systems as well as development of new data models and applications.

An IS/GIS Design and implementation employ a business model that organizes Information Architecture CBPs under the direction of an IT Strategic Plan. The System Design Strategy (see Appendix B) identifies a process and identified projects to build the system. The System Deployment Strategy (see Appendix C) identifies projects to evaluate, test and update system architectures during the planning and budgetary cycles.

Forestry plans to enhance and develop enterprise and desktop GIS datasets for existing and new application proposals. These datasets will be developed and migrated from legacy systems to provide better products, editing and access. Data collection, use and maintainance will be provided by a various IS/GIS desktop and enterprise solutions described in the following CBPs.

Data Architecture Component Based Projects to support Forestry's data and information business needs.

- Low-Cost GPS/GIS Data Collection
- Development of Spatial GIS Library
- Revision of TaxLaw RDBMS
- Revision of RECON/Timber Sales RDBMS
- FR Remote Sensing and Automated Forest Classification

III. Technology Architecture

Introduction:

Technology Architecture refers to the hardware, software, systems, methods and standards that Forestry uses to develop and operate computer systems and communication networks for the transmission of data, voice and video. The Technology Architecture guides the design of Information System/Geographic Information System (IS/GIS) for the purpose of eventual integration with data and applications.

Vision Statement - The Forestry Technology Architecture provides the foundation on which IS/GIS applications and data architectures are built. It provides the infrastructure to support both internal computing needs and extends information technology to external partners and customers via the Internet and network accessible applications. It will support the program desire to make tabular and spatial data and applications accessible to staff, our partners and customers. Cost effective information access to the WDNR network, Forestry databases and applications will be improved for all users.

Organizational Goals and Business Needs:

A Technology Architecture provides hardware and network solutions that support application and data development. Users of a IS/GIS Design must be able to evaluate, access, update and display data through IS/GIS technology. User requirements along with internal and external influences will establish criteria for technology architecture design enabling information and applications run on the system. Technology Architecture baseline requirements are established by a set of organization goals that identify application needs and data requirements.

Internal Influences - Forestry bureau, office, and field operational staff provide the business needs for technology requirements. Agency policy, standards, and procedures provide support and guidance for technology development through the biennial budget process and project proposal procedures.

External Influences - Changing technology mandates that the Forestry continually reassess its IT environment to determine the correct path for upgrades and hardware/software replacement. Upgrades, migrations and replacements are required to keep us compliant with vendors' support agreements; to facilitate cooperation and partnering with external partners; and to meet the needs of the Forestry's internal and external customers. Changes tend to have a ripple effect in information technology.

Organizational Goals and Business Needs - Technology Architecture describes the hardware and software requirements of an IS/GIS Design. These requirements are derived from operational goals and business needs identified in projects that build the actual system. Forestry's ability to implement these projects and activities is dependent upon available funding and resources identified in planning and project request cycles.

Technology Architecture Operational Goals

- Invest in a centralized IS/GIS Design, incorporating local and remote clients with enterprise data and application solutions organized by a biennial strategic planning cycle.
- Keep desktop technology up-to-date with operational goals and industry standards
- Improve data access and sharing for Forestry field operational staff, cooperators and the public via web and network applications
- Implement ARC Spatial Database Engine (ArcSDE) technology solutions
- Implement ARC Internet Map Server (ArcIMS) technology solutions
- Implement Windows Terminal Server (WTS) technology solutions

- Implement low-cost GIS and GPS technology solutions
- Develop hardware and software standards of system data and applications
- Develop a planning cycle to secure funding for technology acquisition and maintenance
- Plan and implement Virtual Private Networking (VPN) for Forestry Field offices, and mobile users.
- Purchase a central file server to store and share data
- Purchase an application server support application and data sharing needs.
- The costs of information technology should be identified in planning efforts to include base funding to acquire and install equipment, as well as for maintenance, repair, life-cycle replacement, and support.
- Confirm the need for and define a standard PC for field and GIS applications.
- All planning and renovation of office spaces should evaluate and incorporate information technology needs.
- System for ordering information is not adequate. Response time from initial request to final installation/config is excessive. We need to create an automated system that will make the acquisition process faster and has information on IT assets/infrastructure at our fingertips (for everyone to see).

See Appendix F for detailed Technology Architecture business needs.

Current Architecture:

Server Environment - The Agency operates a central Digital ALPHA cluster that is maintained by the Bureau of Enterprise Information, Technology and Application (BEITA). This cluster consists of both OpenVMS and Tru64 Unix operating systems. BEITA also supports Geographical Information Services with Windows NT workstations connected to Digital ALPHA Servers running Tru64 UNIX

The Agency's servers are attached to a fiber optic backbone. BEITA supports Fast Ethernet (100Mb/s), FDDI running over copper (category 5) and fiber. TCP/IP is the supported network protocol. TCP/IP stacks are Process Software's TCPWARE product that runs under VMS, Microsoft's NT TCP/IP stack and the TCP/IP stack, which is native to Tru64 Unix. Central office Network Operating System (NOS) is Windows NT version 4. Forestry has approximately 373 PCs with Windows NT workstation version 4 operating systems. Plans are underway to look at Windows XP.

The Agency has 53 networked remote locations throughout the State of Wisconsin. Badgernet supports connectivity to the Remote locations. All Badgernet locations have Cisco routers that support T1 circuits. The Local Area Networks (LAN) deployed at these sites are 10BaseT Ethernet LANs with CISCO switching technology and category 5 cabling. LAN servers are Intel based Windows NT servers. Digital Alphaserver models 1000a, 400s, and 300s are deployed at 23 locations all running NT Server version 4. These servers will be phased out and replaced with Intel based servers as well. The NOS is Microsoft's NT server running LANmanager version 3. The majority of the 23 locations are running dual servers consisting of primary and secondary NT domain controllers.

Database Environment - BEITA has 8 instances of Oracle. These instances are distributed across a number of servers. Following is a summary chart of our database instances:

Common Name	Version	Primary Function(s)
Dnr_test1	7.3.4	Test Environment for Transaction processing
Dnr_prod2	7.3.3.4	Production Environment for Transaction Processing
DNR_WLF1	7.3.4	PRODUCTION ENVIRONMENT FOR WEB/WAREHOUSE Applications
Dnr_wrhs1	7.3.4	Test Environment for Web/Warehouse Applications
DNR_SDE	8.1.5	Production Environment f or Spatial Data Engine
DNR_AIR1	7.3.4	Production Server for the Wisards Application
ORAFLEET	7.3.4	Database for the Fleet Anywhere Application, this

		Server's function may change in the future
(Oraweb)	7.3.4	For use with Internet applications.

GIS data libraries in ArcStorm and SDE are served by a Digital Alpha 2100. A Digital Alpha 1200 serves digital aerial photographs (orthophotos) and other scanned map data.

Internet Environment - BEITA maintains a presence on the Internet via a Microsoft Windows NT server running Microsoft's Internet Information Server software for WWW and read only FTP access. A separate server with similar software is maintained on the Agency's internal network for access by Agency staff only. A Cisco PIXS firewall is the primary security against Internet access and attacks to the Agency Intranet. DNR uses Microsoft Windows NT servers running ESRI's Internet Map Server software, and is connected to the Internet server. In addition, Oracle Application Server (OAS) is running on several servers. Inside the firewall, this includes DNR_WLF and Oracl2. Outside the firewall OAS is running on an Intel, Windows NT Server.

Desktop Environment - The standard desktop is a Pentium PC with NT workstation version 4 operating systems and a standard software suite. The suite includes SMARterm Office, PC Duo, PKZip/WINZIP, Internet Explorer 5.0, MS Exchange, MS Schedule +, MS Office Pro 97, Developer 2000 Run Time, SMS and Sweep. Currently desktop devices are on a four-year replacement cycle, per the statewide enterprise standard. Forestry currently supports 373 devices. ESRI's ArcView 3.2 and 8.x software is distributed to users who have requested GIS application, mapping, and analysis needs. Recreational grade GPS units have been distributed for small data collection and landscape navigation needs.

Future Strategies:

Forestry's approach to Technology Architecture includes a vision of a Forestry IS/GIS Design that will implement technology architectures, software purchases and upgrades through strategic planning and budgetary cycles. Forestry's successful IS/GIS Design depends on proper need assessment, identification of appropriate components for system integration. A project-based approach to system development reduces risks and promotes successes by a show of product for each phase. These projects involve transition and migration of legacy systems as well as development of new data models and applications.

An IS/GIS Design and implementation employ a business model that organizes Component Based Projects (CBPs) under the direction of the IT Strategic Plan. The System Design Strategy (see Appendix B) identifies a process and proposed projects to build the system. The System Deployment Strategy (see Appendix C) identifies projects to evaluate, test and update system architectures during the planning and budgetary cycles

Technology Architecture Component Based Project for system development

- Low-Cost GPS/GIS ToolKit
- FR Division GIS and Mapping WEB Page
- PlanTrac Enhancement/Redesign
- RECON/Timber Sales Enhancement/Redesign
- Fire Zone/Structure Mapping
- ICP Fire Management
- Fire Reporting System
- WEB Prescribed Burn Permitting System
- WEB Access to Fire Weather Modeling Software
- MFL Reporting System
- ESRI License and User Organization
- ArcGIS Citrix MetaFrame Implementation
- WAMS/Active Directory Implementation
- FR Data/Apps Server Purchase

- High Speed Network Communications

IV: Organization Architecture

Introduction:

The organizational architecture refers to the capital and human resources in the Division of Forestry dedicated to Information Technology and how they are used in support of the organization's mission. The Divisions Organizational Architecture also includes the relationship with and services offered from the Division of Forestry to staff and external partners.

Vision Statement: Forestry's organizational architecture ensures that IT investments and infrastructure are managed and deployed effectively. The IT skills of division staff statewide are used in concert for IT planning and development. The division values and cultivates its IT staff, so that it can make intelligent and efficient IT decisions.

Organizational Goals and Business Needs:

1. Users need direction from the central office.
2. Additional support is needed at all levels of the Division of Forestry organization including a dedicated programmer, training, WEB developer, regional support for GIS and PC's, and central office staff.
3. Users need to be better trained in applications. The skill levels of staff should be established and maintained.
4. Develop an adaptive enterprise architecture. The IT organizational structure needs to be defined, including user roles and responsibilities. Processes are needed to set direction and priorities.
5. Existing IT expertise should be recognized, trusted, and utilized.
6. Better communication is needed between IT staff and Forestry staff
7. Ensure IT investments are managed and deployed effectively by holding IT staff and contractors accountable.
8. The Forestry Services section needs to be the primary advisory group that will provide advice and guidance on information technology needs from forestry. The Forestry Services section will consult with BEITA as needed.
9. We should also invest in our staff of web editors to train them in technology that can be implemented to create workflows or applications that ease the burden of staff.

Current Architecture:

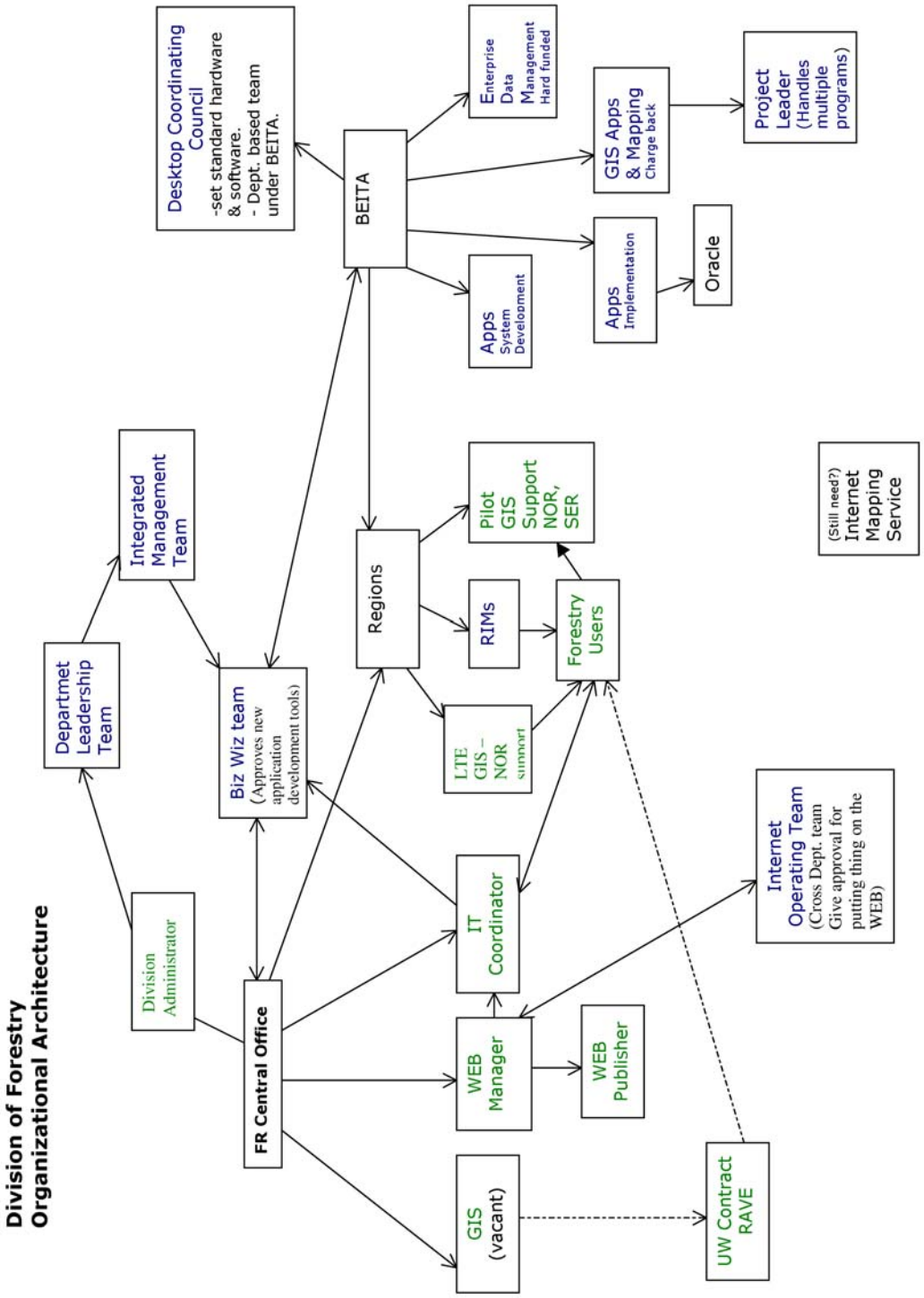
Division of Forestry IT Positions (in green on Organizational Chart, below)

- Planning and Analysis Chief
- IT Coordinator
- WEB Manager

- WEB Publisher
- Pilot GIS Support (NOR, SER)
- UW Contract

Other Support Teams (in blue on Organizational Chart, below)

- DNR-GEO Forestry Project Leader
- Department Positions/Teams that provide services or guidance
- Biz Wiz Team (FR IT Coordinator is a member. Approves new application development tools)
- Internet Operating Team (Cross Departmental Team that gives approval for putting things on the WEB)
- Division Leadership Team (Div of Forestry Administrator is a member. First step in one path to getting forestry projects approved and to BEITA)
- Integrated Management Team (Another step in getting forestry projects approved and to BEITA. May identify other funding sources or other projects that could be combined with it. Try to eliminate duplication of effort)
- Desktop Coordinating Council (Department based team sets standards for hardware and software)
- Regional Information Management Specialists


Division of Forestry
Organizational Architecture
Desktop Coordinating Council
-set standard hardware & software.
- Dept. based team under BEITA.
BEITA
Enterprise Data Management Hard funded
GIS Apps & Mapping Charge back
Project Leader (Handles multiple programs)
Apps System Development
Apps Implementation
Oracle
Integrated Management Team
Departmet Leadership Team
Biz Wiz team (Approves new application development tools)
Regions
Pilot GIS Support NOR, SER
RIMs
Forestry Users
LTE GIS – NOR support
(Still need?) Internet Mapping Service
Division Administrator
FR Central Office
IT Coordinator
Internet Operating Team (Cross Dept. team Give approval for putting thing on the WEB)
WEB Manager
WEB Publisher
GIS (vacant)
UW Contract RAVE

Future Strategies:

Hopefully this document will enable the central office to provide better IT direction.
The responsibilities of the following positions should be filled by existing or new staff: Regional computer/GIS support, IT Training Staff, Regional Web Page Administrators.
Existing IT expertise within Forestry should be recognized, trusted, organized, and utilized for IT training, support, and planning.

V: Internet Architecture

Introduction:

Vision Statement: Develop new services and increase customer base for existing services through the use of information technology. We must make our commitment to customers highly visible through an aggressive approach to problem resolution through improved technical communications. The division's website is an efficient, interactive tool that allows for multilateral communication for the division, its business partners, and the public. All useful forestry data are available on the division website or ftp site.

Organizational Goals and Business Needs:

1. Encourage staff in the creative use and application of web technology, for training, communication, and customer service.

2. Encourage and provide staff with a standard set of options to easily create, edit, revise and maintain online material to develop and maintain web pages. Formalize the Forestry web work flow process and Division support for Internet architecture.

3. Increase the visibility and use of the division of forestry's Web site

4. Create effective Forestry Intranet site to enhance internal communications. Forestry's website needs to be interactive, providing a means of multilateral communication.

5. Ensure basic forestry programs are represented on the DNR website in ways that best meet both customer and program needs.

6. More data needs to be available on the website.

7. Applications need to be available on the internet.

8. Content management applications (in-house built) should be used to allow sections update their own web content. Several different people can sign off on the content before it gets sent live.

Current Architecture:

The forestry section of the DNR website has played an important role in helping to meet these goals. Over the past five years, forestry's part of the DNR website has grown into a very important tool in the implementation of sustainable forestry in Wisconsin. The web has proven to be a powerful two-way communication tool between the forestry program and our many stakeholders. Forestry information on the DNR website has helped Wisconsin citizens learn about the forest resource so they can be better informed partners in decisions about resource management. We expect the importance of the web to continue to grow as staff better understand the capabilities of this powerful tool and as more customers find the site.

The 2001 State of the Internet Report, released by the United States Internet Council and the International Technology and Trade Associates, states that the global online population crossed the half billion milestone last year and the online demographics increasingly reflect offline realities. Native

English speakers lost their dominance in 2001 and now represent approximately 45% of the online population. The report also states that e-commerce continued to grow and online business became more mainstream. Growth of the Internet over the last decade has been mind boggling. It is estimated that fewer than 90,000 people worldwide used the net on a regular basis in January 1993. The number of people using this still-young medium has grown in a geometric progression. Within five years, some industry estimates predict that the number of users worldwide will pass the one-billion mark. In the Summer of 2000, women using the net surpassed men in the U.S. for the first time. The overall diversity of users continues to grow.

Most of our partners and stakeholder organizations are online and regularly use both e-mail and the World Wide Web to stay in touch with the DNR forestry programs. While many landowners and other individual customers are also online, we expect this number to continue to grow – making the DNR forestry website an ever more important tool for sharing program information and materials.

The Internet has become a powerful research tool, offering what seems to be an unending reservoir of information. As more of our Division's field staff become comfortable with and knowledgeable about their computer, we expect they will come to rely more on the Internet as a tool to assist in their work. And as the Division employees become more familiar with the DNR website, they will increasingly refer customers to the site.

The Division of Forestry has just completed a strategic plan for Forestry Communication and Education in Wisconsin. Each year of the five-year plan will focus on key forestry messages, building on each other as the plan implementation progresses. The Internet has been identified in the plan as an important tool in reaching partners and stakeholders. The marketing firm retained by the Division of Forestry to help prepare this plan has recommended that a separate website targeted at the general public be developed for implementation of this five-year campaign. This site would have an intuitive address that could be used in the campaign and that would be easy for the public to remember when they see it in an ad, on a television commercial or on a billboard.

During 2000, the DNR forestry program conducted an assessment of Wisconsin's forest resource and then, during 2001, gathered public input on the forestry trends and issues that had been identified in the assessment. The program is using all of this to prepare a statewide forest plan in 2002. This plan will articulate a vision for Wisconsin's forest resources, identify issues that affect our ability to achieve that vision, and outline a course of action to address the priority issues over the next decade. The website has been an important tool throughout this forest planning process – to research data for the assessment, gather public input at several stages and, later in 2002 and beyond, to communicate, implement and continually reshape the forest plan.

The Division of Forestry was a participant in the 2001 "Education and Interpretation Services Needs Assessment and Analysis" coordinated by the Bureau of Parks and Recreation. A key recommendation of this study report was the development of a digital library to support interpretation and education services within the agency through the DNR intranet. We expect that DNR's intranet and extranet will both be key to bolstering the effectiveness of our interpretation, education and communication programs.

See Appendix G for more details of the current Internet Architecture.

Future Strategies:

Forestry's website should be the gateway to all Forestry data and mission-critical applications.

There should be a streamlined process to update information on the website.

More individuals should be trusted to update the website.

The current forestry internet address is too long, complex, and difficult to access directly. A simpler forestry internet address should be used, such as forestry.wi or www.forestry.wi.

The website should be promoted via advertising.

The forestry address (http://www.dnr.state.wi.us/org/land/forestry/) should be printed on all forestry publications, correspondence and other printed materials distributed by forestry staff.

Make all useful forestry data available on the division website or ftp site.

Prepare an inexpensive handout (bookmark or other simple item) that could be distributed at trade shows, fairs and other exhibits to increase public awareness of the website.

VI: Security Architecture

Introduction:

A security architecture provides any policy or statutory provisions related to privacy, cost recovery, liability, legal disclaimers, copyright or licensing related to land information, mapping, data distribution, usage, and the Internet. Address any open records laws issues that relate to the data distribution needs of the agency.

Organizational Goals and Business Needs:

Current Architecture:

Future Strategies:

Appendix A – Definitions

Applications architecture refers to the framework for building and managing the automated processes or systems that an organization uses to support its programs and provide services to its customers.

Information Architecture refers to Forestry's framework for collecting, storing, documenting, and distributing data that support the business objectives of the program and its customers.

Technology architecture is the hardware/software infrastructure, standards and guidelines that guide the design of IT systems for the purpose of eventual integration.

Appendix B - System Design Strategy

Appendix C - System Deployment Strategy

Appendix D – Staff Services Survey and Results

During the Division of Forestry's IT Planning process a customer survey was developed to gather information need for the development of an IT Plan modeled after the Agency's IT Strategic Plan. The development of the Forestry IT Plan will help provide information for the Division Strategic Plan.

Forestry's customer survey is a unique approach focusing on understanding how the Forestry Division collects, stores, and shares information, Internet usage, staffing needs, business needs, and the acceptance of technology. The survey process is a function of the overall IT Planning process to understand how the division interacts internally as well as with the agency as a whole.

Customer surveys help evaluate essential planning steps for network performance and data security. A survey helps the inventory of hardware, software and network performance. Data security and network evaluation help establish information storage, recovery and sharing needs for formulating recommendations in the planning process. Recommendations from the survey included in the final IT Plan help formulate a priority of initiatives, estimate costs, and development of a timeline for project and budget implementation.

The information gained from a customer survey relates to three groups of participants for which an IT Plan is focused. These three groups are the management staff (policy makers), field staff (information collectors and users) and the public (information requesters).

Below are the highlights of Forestry Staff responding to the Forestry IT Survey. A full report including comprehensive results can be found in the finial Forestry IT Plan document. This summary is organized by the sections included in the survey given to forestry staff.

Important Results

- Total number responding to the survey = 160
- Percent responding to survey = ~27%
- 90% have a computer
- 100% of staff reporting said they had an e-mail address.
- Word/Exchange/Internet Explorer most used software.
- Direct link of recreational GPS to GIS is needed
- Train new hires in GIS
- Develop GIS and/or WEB applications f or MFL, RECON and Fire apps
- Create infrastructure to support new apps – servers and software
- 41% of responding staff are dial-up users
- 40% of respondents are dissatisfied with GIS and Desktop support
- Additional content requested for the DNR forestry internet website
- GIS Data for download from the web
- Personnel Directory is the most used link on the Intranet site
- Garmin hand held units are being used by most of the field staff

Appendix E - Detailed Information Architecture Business Needs

DOP & Image Raster:

- Digital Image Library – GIS, Digital Camera and Electronic Documents
- Storage and serving power
- Video

Desktop GIS Library

- Protection Data
- Science Data
- Management Data
- Services Data

Enterprise Framework Layers:

- Protection Data
- Science Data
- Management Data
- Services Data

Data Collection/Development:

- Softcopy DOP development
- Collection and use of TM/LIDAR
- GPS – Desktop and Enterprise
- GIS – Desktop and Enterprise
- MFL Stand Layer
- RECON Timber Sales Layer
- Property Boundary Collection
- Standards for GPS/GIS data collection

Data Access

- Internet Apps
- Internet Share
- Intranet Apps
- Intranet Share
- Traditional Media exchange

Appendix F - Detailed Technology Architecture Business Needs

General
- Keep apps up to date for op goals
- Keep apps up to date with tech
- Tech avail to all users

Software Technology:
- GPS Data Collection
- GIS Mapping
- Multi-User Apps for RDBMS
- Transactional editing of RDBMS
- GIS – ArcIMS, ArcGIS and ArcSDE Techology
- Windows Terminal Server Technology
- Network Infrastructure
- Desktop infrastructure
- WEB – ASP, Java and HTML
- ESRI License Management

Data Access (GIS, IS and Documents):
- Public – Private Forestry, Open lands
- Coops – Consultant support/Private forestry
- WDNR Staff – Apps/Programs and Analysis

Hardware Technology
- Network Infrastructure
- Desktop infrastructur

Data Use:
- Raster Back Drops for: QA/QC GIS and GPS data collection
  - Upload To GPS Units
  - Base Map Production
  - Registration of unrectified imagery

  Enterprise and Desktop Application Development
  Spatial Analysis – Compliance, Species ID, Change Detection
- Vector data for: Base Map Production
  QA/QC GIS and GPS data collection
  - Upload/Down Load to GPS Units
  - Transactional Editing
  - Enterprise and Desktop Application Development
- Electronic Documents: Enterprise and Desktop Application Development

Appendix G - Detailed Current Internet Architecture

Audiences Forestry Reaches via Internet

Interested citizens

Wisconsin residents care about the environment but social research conducted by the DNR Bureau of Forestry has shown a low level of knowledge about Wisconsin's forest resource and forestry issues in our state. Therefore, Wisconsin's citizenry is a very important audience to the DNR forestry program and the web is one of the many communication / education tools we use to bridge disconnects between the forests and residents of Wisconsin. Forestry's section of the DNR website contains resource information about Wisconsin's urban and rural forests.

Stakeholders

Many different interest groups care deeply about the forest resource and closely monitor the state of the forest resource and what DNR is doing to manage and protect the resources. The web has proven to be an important tool to keep stakeholders updated on forestry programs and projects as well as the status of forest health and welfare in Wisconsin. The Division of Forestry has also successfully used the website as one of many tools to accept public input on key programs and projects. Organized groups as well as individual stakeholders appreciate this method as an option for providing input.

K-12

Informing future leaders and decision makers about the importance and value of Wisconsin's forests is an important communication goal for the DNR forestry program. Forestry materials for students and teachers are shared via DNR's EEK! (Environmental Education for Kids) web pages as well as through partner's web sites (Wisconsin Forest Resource Education Alliance at http://www.wfrea.org/ and Wisconsin Center for Environmental Education at http://www.uwsp.edu/cnr/k12forestry/leaf). Additional forestry education funding is distributed through the Wisconsin Environmental Education Board with reports on resulting materials available on their website at http://www.uwsp.edu/cnr/weeb/ . We anticipate that the new website for the 5-year forestry c/e strategic plan will include a "kids section."

Homeowners

Homeowners find a variety of useful information on the forestry section of the DNR website – from urban tree care advice to how to rid their homes of that pesky lady beetle!

Landowners

A major focus of DNR forestry programs – and of our communication and education efforts – is on private forest lands since nearly 70 percent of the forests in Wisconsin are privately owned. Of particular concern are the 9 million acres of forest land owned by about 262,000 private individuals and families. The web will continue to grow as an important communication tool to this crucial audience as more and more Wisconsin households go online. Professional foresters work with approximately nine thousand landowners each year. We use the website to share forest management and other technical forestry information with these landowners who already practice good forest stewardship. We use the website to convey information about our programs to the broad spectrum of landowners from new to experienced. We also use the e-mail to inform potential landowners about forestry programs. Many landowners are interested in the forest tax law programs as a way to keep their property taxes manageable. We use the website to inform those currently enrolled in the programs of their responsibilities and to introduce the program to those considering enrollment. DNR's forestry program believes in a voluntary approach to move towards sustainable forestry and the web is an important communication tool to reach landowners who participate in our voluntary programs such as Forestry Best Management Practices for Water Quality as well as those we would like as partners in our voluntary programs. Forestry offers financial as well as technical assistance to landowners to encourage forest stewardship so we use the web to share information to grant applicants and recipients. The web is also a good tool to share information to and about landowners like Wisconsin Woodland Leaders who are helping encourage neighbors and other landowners to practice good

forestry. Wisconsin Woodland Owners Association, land trusts, forest co-operatives, and other landowner groups are also an important audience of our website as are our partners in delivering forestry service and programs to landowners (such as cooperating and consulting foresters, Wisconsin Forest Productivity Council, and Tree Farm Program).

Forest Industry
The forest industry owns seven percent of the forest land in Wisconsin and is also an important audience of the website. We share information with them about our specific programs via the website and also share information about the industry to the general public. The DNR Forestry Marketing and Utilization unit produces popular directories of companies in Wisconsin's primary and secondary forestry sector of the economy. By making these directories available online, we're able to better serve customer needs and save postage and printing costs as the number of hard copies is decreased by having the information on the web.

Other Partners
Many of our forestry programs depend on a wide variety of external partners for successful implementation. Key among them are the local fire departments around the state who assist in wildland fire prevention and suppression. A variety of non-governmental organizations are also important partners in the delivery of forestry programs in Wisconsin. We also work closely with other state and federal agencies on a variety of programs. Our website is an important tool for two-way communication with each of these partners.

Evaluating the website

Evaluation is a critical component to all of our efforts – and the web is no exception. Our goal is to stay customer driven and communicate relevant information and materials in ways meaningful to customers. Following are methods we're using to gauge the effectiveness of our website.

WebTrends
Monthly reports provide numerical feedback regarding the number of visitors, what pages users visit and for how long, entry and exit points and other data. (see some February 2002 information below)

Incoming e-mail
Web users have the opportunity to submit e-mail inquiries via the State Portal, the DNR webmaster, the forestry web manager or directly to program specialists listed on various webpages. All incoming e-mail from the first three options are routed through various means to the inbox of the forestry web manager who uses them to gauge customer satisfaction with the site information and usability.

Staff feedback
Comments and suggestions from Division specialists, field staff and other DNR employees provide another method of judging the usefulness of the forestry web pages.

User testing
The Department is conducting user tests to refine a new design and organization for the top-level pages of the DNR website. We expect that process to provide valuable information for our program since landowners and other key audiences will be included in the tests. The forestry program can do additional testing as needed, especially if we determine changes are needed on the design of our program top level page. In addition to asking individual users for feedback, the forestry web manager regularly checks with partner organizations to solicit suggestions for improving the forestry section of the website.

Current use of website

To provide a glimpse of the current use of the DNR forestry webpages, here are a few statistics for the month of February 2002. The WebTrends report shows 32,067 visitor sessions to the forestry section of the DNR website during the month of February 2002. The number of visitors per day ranged from 883 to 1412. The lowest traffic was between 11 p.m. and 7 a.m. with a fairly even spread between the remaining hours of each day. The number of visitors during typical work hours was just slightly higher than the number of visitors during after-work hours.

9,981 visitors came to the forestry section of the DNR website once during February. Another 691 visitors made a repeat visit. And 423 visited 3 to 9 times while 446 visitors came back ten or more times during the month of February. State of Wisconsin employees accounted for just 1.42% of the total hits to the forestry site in February.

The following numbers reflect cumulative visitor sessions to the top 100 most accessed pages grouped by section for the month of February:

Most Requested Pages

Section of Forestry Site	# of Visitor Sessions
Forest nursery	5985
Tree identification	3370
State Forests	3263
Aerial photo pages	3016
Forestry front page	2387
Private forestry	2323
Urban forestry	1618
Tax law programs	1526
Forest products	1206
Forest health	481
Forest fire	273
Forest planning	185

Single pages	# of Visitor Sessions in February
Resources (links and publications)	857
DNR forester listing by county	600
Forest inventory information	533
Open lands information	353
Forestry employment	328

Ten most downloaded files in the month of February:

File	Session downloads
State Forest maps	1014
Nursery order form	464
Collecting tree seeds	275
MFL application and guidance	143
Order form for open lands listings	115
Cooperating forester directory	79
MFL transfer form	47
Airphoto order packet	45
Comparison: cost-share programs	42
MFL withdrawal form	36

E-mails from our web pages

The forestry web manager received a total of 698 e-mails via the web last year. Many came directly to the program from visitors in the forestry pages. Some were sent to the webmaster or DNR customer service and were rerouted to the forestry web manager. A few came from the State of Wisconsin web portal. Additional e-mails undoubtedly originated from the website but went directly to program specialists or to field foresters so we don't have a tally of those.

The following were the most frequent topics of the e-mails (listed in order):

1. Open lands for hunting
2. Purchasing tree seedlings and buying / selling seeds
3. Forest insects and diseases
4. Technical questions about tax law programs
5. Looking for assistance from a DNR forester
6. Burning permits & regulations; current fire conditions; how to become qualified for forest firefighting
7. Looking for online publications and / or publication order form
8. Aerial photos
9. List of native trees, shrubs and plants
10. Additional details about cost-sharing programs
11. Activities allowed on state forests (firewood cutting, Christmas trees, collecting mushrooms & birch bark, policies on atv and snowmobile use)
12. Want photos of species on our tree identification pages and on pages describing nursery stock for sale
13. Champion tree program
14. Looking for assistance or advice regarding storm damage
15. Forestry career information / DNR forestry employment
16. Forest history information
17. Dealing with invasive species
18. Seeking listing of loggers in Wisconsin or wants to report a destructive logging experience
19. Want state forest campsite maps online
20. Looking for additional links to other Wisconsin forestry groups

Much of the information to answer these e-mails is already available on the website. In our redesign of the forestry top page (see 2002 proposed work plan below), we'll look at ways to make these topics easier to find and include answers in a "frequently asked questions" section. In other cases, we'll fill in information as needed in the various sections of the forestry website to address these commonly asked questions